

Stress and Fatigue in the Aviation Environment
U3004494 / Version 1
14 Dec 2004

SECTION I. ADMINISTRATIVE DATA

All Courses Including This Lesson	<u>Course Number</u>	<u>Version</u>	<u>Course Title</u>
	6A-61N9D	05	Flight Surgeon Course (Primary)
	6A-61N9D(RC)(P1)	05	Flight Surgeon Course (Primary), Phase I
Task(s) Taught(*) or Supported	<u>Task Number</u>	<u>Task Title</u>	
	081-CF9-0008 (*)	<u>INDIVIDUAL</u> MANAGE THE EFFECTS OF STRESS AND FATIGUE IN THE AVIATION ENVIRONMENT	
Reinforced Task(s)	<u>Task Number</u>	<u>Task Title</u>	
Academic Hours	The academic hours required to teach this lesson are as follows:		
	<u>Resident Hours/Methods</u>		
		2 hrs / Conference / Discussion	
	Test	0 hrs	
	Test Review	0 hrs	
	Total Hours:	2 hrs	
Test Lesson Number		<u>Hours</u>	<u>Lesson No.</u>
	Testing (to include test review)	1 hr 15 mins	U3004503 version 1
Prerequisite Lesson(s)	<u>Lesson Number</u>	<u>Lesson Title</u>	
	None		
Clearance Access	Security Level: Unclassified Requirements: There are no clearance or access requirements for the lesson.		
Foreign Disclosure Restrictions	FD5. This product/publication has been reviewed by the product developers in coordination with the USASAM foreign disclosure authority. This product is releasable to students from all requesting foreign countries without restrictions.		

References

<u>Number</u>	<u>Title</u>	<u>Date</u>	<u>Additional Information</u>
0-291-39857-X	Flight Stress: Stress, Fatigue and Performance in Aviation	01 Jan 1994	
DA PAM 600-24	Suicide Prevention and Psychological Autopsy	30 Sep 1988	
FM 3-04.301	Aeromedical Training for Flight Personnel	29 Sep 2000	

Student Study Assignments

Study Student Handout and review reference material listed above.

Instructor Requirements

One instructor either 73B, 91WF, 65DM3, 61N.

Additional Support Personnel Requirements

<u>Name</u>	<u>Stu Ratio</u>	<u>Qty</u>	<u>Man Hours</u>
None			

Equipment Required

<u>Id Name</u>	<u>Stu Ratio</u>	<u>Instructor Ratio</u>	<u>Spt</u>	<u>Qty</u>	<u>Exp</u>
COMPU-PROJ OVERHEAD PROJECTOR WITH COMPUTER INTERFACE	1:50	1:1	No	0	No
COMPUTER-INSTRUCTOR COMPUTER (CPU) WITH KEYBOARD, INSTRUCTOR USE ONLY	1:50	1:1	No	0	No
SCREEN-INSTRUCTOR SCREEN PROJECTOR, INSTRUCTOR USE	1:50	1:1	No	0	No
* Before Id indicates a TADSS					

Materials Required**Instructor Materials:**

Lesson Plan - Stress and Fatigue in the Aviation Environment.

Student Materials:

Student Handout.

Classroom, Training Area, and Range Requirements

**Ammunition
Requirements**

<u>Id</u>	<u>Name</u>	<u>Exp</u>	<u>Stu Ratio</u>	<u>Instr Ratio</u>	<u>Spt Qty</u>
None					

**Instructional
Guidance**

NOTE: Before presenting this lesson, instructors must thoroughly prepare by studying this lesson and identified reference material.

**Proponent
Lesson Plan
Approvals**

<u>Name</u>	<u>Rank</u>	<u>Position</u>	<u>Date</u>
Bost-Pittman, Carolyn	DAC	ISS	07 Dec 2004
Campbell, John	LTC	Dean	09 Dec 2004
Schwab, Douglas			07 Dec 2004

SECTION II. INTRODUCTION

Method of Instruction: <u>Conference / Discussion</u>
Instructor to Student Ratio is: <u>1:50</u>
Time of Instruction: <u>5 mins</u>
Media: <u>Large Group Instruction</u>

Motivator

As aircrew members, you will need to know the effects of stress on your body and how and what you do which influences the degree of stress you place on yourself. Aviation stressors are unique to you as aircrew members and have considerable impact on mission readiness and individual health. This class is intended to heighten your awareness of those stressors that are both unique to aviation, and those that are not but may impact you as aviators in a unique manner due to your chosen profession.

Terminal Learning Objective

NOTE: Inform the students of the following Terminal Learning Objective requirements.

At the completion of this lesson, you [the student] will:

Action:	Manage the effects of stress and fatigue.
Conditions:	While performing as an aircrew member.
Standards:	In accordance with (IAW) FM 3-04.301, The Leader's Guide to Crew Endurance, Flight Stress, Flight Psychology, Fundamentals of Aerospace Medicine, and DA PAM 600-24.

Safety Requirements

None.

Risk Assessment Level

Low

Environmental Considerations

NOTE: It is the responsibility of all soldiers and DA civilians to protect the environment from damage.
None.

Evaluation

Each student will be evaluated on this block of instruction on the last day at USASAM. You will be given a 50 question, written examination in which you must correctly answer 35 questions to receive a passing score.

**Instructional
Lead-In**

You have attended a variety of classes that focused on the medical and physiological aspects of aviation. This class identifies the specific effects of psycho-physiological factors on aviators and recommends countermeasures for controlling the negative effects of stress and fatigue.

SECTION III. PRESENTATION

NOTE: Inform the students of the Enabling Learning Objective requirements.

A. ENABLING LEARNING OBJECTIVE

ACTION:	Select the three definitions of stress.
CONDITIONS:	Given a list of definitions.
STANDARDS:	IAW FM 3-04.301, Flight Stress, and Health Psychology.

1. Learning Step / Activity 1. Provide instruction on the three definitions of stress.

Method of Instruction: Conference / Discussion

Instructor to Student Ratio: 1:50

Time of Instruction: 5 mins

Media: Large Group Instruction

a. Walter Cannon (1932) researched the "fight-or-flight" response, and linked this to the arousal of the sympathetic nervous system and endocrine system. The "rush", or "cranked-up" feeling when frightened or surprised is a result of the rapid arousal of these systems.

b. Hans Selye (1956), considered by many to be the father of stress research, defined stress as the nonspecific response of the body to any demand placed upon it. He called this pattern of responding the "General Adaptation Syndrome", which consists of three stages:

(1) Alarm Stage - the organism is mobilized to meet the threat.

(2) Resistance Stage - the organism attempts to cope with the threat.

(3) Exhaustion Stage - the organism fails to successfully cope with the threat.

c. Lazarus (1968) researched the "psychological appraisal process". This model suggests that when confronted with a potential stressor, humans simultaneously evaluate the meaning of the event (positive, negative, neutral), the degree of harmfulness associated with the event, and their available coping resources. According to this model, stress is defined as greater perceived threat than perceived coping abilities.

NOTE: Conduct a check on learning and summarize the learning activity.

CHECK ON LEARNING: Conduct a check on learning and summarize the ELO.

B. ENABLING LEARNING OBJECTIVE

ACTION:	Select the signs and symptoms of stress.
CONDITIONS:	Given a list.

STANDARDS:	IAW FM 3-04.301.
-------------------	------------------

1. Learning Step / Activity 1. Provide instruction on the signs and symptoms of stress.

Method of Instruction: Conference / Discussion
 Instructor to Student Ratio: 1:50
 Time of Instruction: 5 mins
 Media: Large Group Instruction

a. Physical responses to stress include both immediate symptomatology, and potentially long-term health consequences of unmanaged stress:

(1) Symptomatology includes, but is not limited to:

- (a) Sweaty palms.
- (b) Increased heart rate and blood pressure.
- (c) Trembling.
- (d) Shortness of breath.
- (e) Gastrointestinal distress.
- (f) Muscle tension.

(2) Potentially long-term health consequences:

- (a) Sleep problems (insomnia).
- (b) Backaches and other muscle pain.
- (c) High blood pressure.
- (d) Immune system suppression.
- (e) Fatigue.
- (f) Anxiety disorders.

b. Emotional signs and symptoms can include:

- (1) Irritability.
- (2) Hostility.
- (3) Anxiety, or increased worrying.
- (4) Decreased self-esteem.
- (5) Feelings of helplessness.
- (6) Loss of interest in pleasurable activities (anhedonia).

c. Cognitive signs and symptoms can include:

- (1) Obsessions.
- (2) Decreased attention.
- (3) Impaired memory.
- (4) Impaired judgment.
- (5) Poor psychomotor coordination (hand-eye coordination).

d. Behavioral signs and symptoms are limitless, and can include:

- (1) Explosiveness.
- (2) Withdrawal or social isolation.
- (3) Alcohol or substance abuse.
- (4) Suicide.

NOTE: Conduct a check on learning and summarize the learning activity.

CHECK ON LEARNING: Conduct a check on learning and summarize the ELO.

C. ENABLING LEARNING OBJECTIVE

ACTION:	Select the correct actions to prevent suicide in a coworker who hints about suicide.
CONDITIONS:	Given a list.
STANDARDS:	IAW DA PAM 600-24.

1. Learning Step / Activity 1. Provide instruction on the correct actions to prevent suicide in a coworker who hints about suicide.

Method of Instruction: Conference / Discussion
Instructor to Student Ratio: 1:50
Time of Instruction: 5 mins
Media: Large Group Instruction

a. Danger signs for suicide risk include:

- (1) Talking or hinting about suicide.
- (2) Giving away possessions or making a will.
- (3) Obsession with death.
- (4) Specific plan, with access to lethal means.

- (5) Buying a gun.
- (6) History of suicide attempts.
- (7) Alcohol or substance abuse.

b. Actions to be taken to prevent suicide:

- (1) Talk supportively, not judgmentally.
- (2) Be direct. Talking about suicide will not provoke it. If you suspect suicidal ideation, ask. Suicidal individuals will most likely be relieved that someone is concerned about them. Admitting to suicidal ideation is often a cry for help, and failing to address the matter directly may have disastrous results.
- (3) Ensure the soldier receives prompt medical attention by escorting the individual to the flight surgeon, emergency room, mental health clinic, or unit commander. Once a soldier is put in contact with these resources, well established procedures will ensure the service member is appropriately evaluated and treated.

NOTE: Conduct a check on learning and summarize the learning activity.

CHECK ON LEARNING: Conduct a check on learning and summarize the ELO.

D. ENABLING LEARNING OBJECTIVE

ACTION:	Identify the different classes of stressors.
CONDITIONS:	Given a list.
STANDARDS:	IAW FM 3-04.301

1. Learning Step / Activity 1. Provide instruction on the different classes of stressors.

Method of Instruction: Conference / Discussion
 Instructor to Student Ratio: 1:50
 Time of Instruction: 5 mins
 Media: Large Group Instruction

a. Environmental stressors

- (1) Altitude
- (2) Heat
- (3) Cold
- (4) Terrain
- (5) Weather
- (6) Ergonomics

b. Psychosocial stressors

- (1) Marriage
- (2) Death in the family
- (3) Reassignment
- (4) Illness or injury to self, family, or close friend

c. Cognitive stressors

(1) We can increase our stress by the way we view situations and events. The following is a list of cognitive “bad habits”:

(a) “All or nothing thinking”, e.g., “either I get an award for my work performance or I am a failure”. There is no “in between” or flexibility in such thinking.

(b) “Failure to focus on the here and now” involves distracting oneself from the task at hand by worrying about mistakes of the past or potential problems in the future.

(c) Too many “musts” and “shoulds”. We increase our stress when we expect that events must turn out exactly as we expect.

d. Alcohol use.

(1) Affects judgment, thermal stress tolerance, visual acuity, perception, coordination and communication. Can be fatal in large quantities or when operating a vehicle or other machinery.

(2) 12-hour bottle to brief rule (AR 40-8 Temporary Flying Restrictions Due to Exogenous Factors).

(3) Alcohol use is potentially hazardous and should be treated like any other hazard, with a risk management approach. Each individual must realistically assess his/her alcohol abuse potential considering factors such as family history of alcoholism, current stressors and emotional state, and personal history of alcohol use. Then the individual must take countermeasures (e.g., limiting or eliminating alcohol use) to reduce the hazard potential.

NOTE: Conduct a check on learning and summarize the learning activity.

CHECK ON LEARNING: Conduct a check on learning and summarize the ELO.

E. ENABLING LEARNING OBJECTIVE

ACTION:	Select the factors that determine the impact of stress on performance.
CONDITIONS:	Given a list.

STANDARDS:	IAW FM 3-04.301; Flight Stress.
-------------------	---------------------------------

1. Learning Step / Activity 1. Provide instruction on the factors that determine the impact of stress on performance.

Method of Instruction: Conference / Discussion
Instructor to Student Ratio: 1:50
Time of Instruction: 5 mins
Media: Large Group Instruction

a. Mental skills required by the task or situation.

b. Stress characteristics of the situation.

c. Individual's biological make-up.

d. Individual's psychological make-up.

e. The "Yerkes-Dodson Law" suggests an inverted "U" relationship between stress and performance, with moderate levels of stress resulting in the best performance. While this relationship may be true for measures of arousal (coma vs. over arousal), research has not demonstrated this relationship with regard to human performance, especially aviation performance. In fact, increased levels of stress have not reliably been correlated with increased performance to date. While both positive and negative events may lead to stress (i.e. death of spouse vs. having children), the experience of stress is rarely appraised as a positive experience. As such, the inverted "U" relationship between stress and performance has not been reliably demonstrated in research.

NOTE: Conduct a check on learning and summarize the learning activity.

CHECK ON LEARNING: Conduct a check on learning and summarize the ELO.

F. ENABLING LEARNING OBJECTIVE

ACTION:	Select the impact of stress on pilot performance.
CONDITIONS:	Given a list.
STANDARDS:	IAW Flight Stress.

1. Learning Step / Activity 1. Provide instruction on the impact of stress on pilot performance.

Method of Instruction: Conference / Discussion
Instructor to Student Ratio: 1:50
Time of Instruction: 5 mins
Media: Large Group Instruction

a. Pilots rely upon several cognitive abilities to successfully perform their mission. These abilities include:

(1) Psychomotor abilities, which include hand-eye coordination, muscular coordination, and strength.

(2) Attention is the cognitive ability to focus a "mental spotlight" on sensory inputs, motor control, memories, or internal representations. It can be allocated to different activities based on perceived importance, or salience.

(3) Memory is the ability to recall previously learned information. Memory abilities are dependent upon one's memory capacity, memory strategies, and rehearsal, which serve to facilitate the transfer of information from short-term to long-term storage.

(4) Judgment and decision making.

(5) Prioritization of tasks.

(6) Communication.

b. Both self-imposed stress and aviation-specific stress have the following effects on the above noted cognitive abilities of pilots:

(1) Psychomotor abilities decline. For example, tracking abilities decrease, with a tendency toward more time off-target, overcorrections, and less smooth movements.

(2) Attentional abilities may be compromised during stress in the following ways:

(a) "Perceptual Tunneling" is the narrowing of sensory information processed by the brain (i.e. visual field). This can result from both emotional stress and cognitive workload, and can occur in both visual and non-visual sensory channels. For example, a pilot may attend to the most significant stimuli (brightest light, loudest noise) at the expense of other perceptual cues.

(b) "Cognitive Tunneling" is the narrowing of what is considered important in the attentional field. An example would be a pilot who does not appropriately monitor his airspeed because he is intently focusing on making the proper radio call at the proper time.

(c) "Task Shedding" is tunneling carried to the extreme. This is when entire tasks are completely abandoned. For example, tunneling may be missing a radio call while on approach with a caution light illuminated, while task shedding is forgetting to do the pre-landing checks altogether.

(3) Memory abilities decline in the following manner:

(a) Overall memory capacity declines under stress. Whereas the average individual can hold 7 (+/- 2 digits) in memory for a short time, this declines under stress.

(b) Memory strategies are subject to two common errors under stress:

1. The "Simplification Heuristic" is the tendency to oversimplify information recalled from memory during the problem-solving or decision-making process.

2. The "Speed/Accuracy Tradeoff" is the attempt to maintain the speed of one's responses at the expense of accuracy (most common), or the attempt to

maintain the accuracy of one's responses at the expense of speed (experienced pilots).

(c) Stress also decreases the ability to learn new information. "Stress Related Regression" is the tendency to forget recent learning and revert to old behaviors under stress.

(d) Once information has been learned and is in long-term storage (like driving a car or doing simple arithmetic), it is fairly resilient to stress.

(4) Judgment and decision-making abilities may be compromised by stress, with inexperienced pilots tending to make a disorganized assessment of alternatives, to rush to a decision, and to seek premature closure.

(5) Communication abilities may be compromised by both the speaker and listener under stress, with changes in speech production, comprehension, and "group think". Group think is the tendency to be more confident of our opinions when they are shared by others, and the tendency to rely on authority figures when there is a perceived threat. This process may impede communication when perceptions differ between group members.

NOTE: Conduct a check on learning and summarize the learning activity.

CHECK ON LEARNING: Conduct a check on learning and summarize the ELO.

G. ENABLING LEARNING OBJECTIVE

ACTION:	Match individual stress coping mechanisms with the four classes of stress coping mechanisms.
CONDITIONS:	Given a list.
STANDARDS:	IAW FM 3-04.301.

1. Learning Step / Activity 1. Provide instruction on the four classes of stress coping mechanisms.

Method of Instruction: Conference / Discussion
Instructor to Student Ratio: 1:50
Time of Instruction: 5 mins
Media: Large Group Instruction

a. Avoid stressors:

(1) This is the most powerful technique because it involves preventing your exposure to known stressful events.

(2) Examples include good time management, tough realistic training, good problem solving skills, and good nutrition.

(3) Practice good cockpit and crew communication:

(a) Talk.

- (b) Ask questions.
- (c) Utilize 3-way confirm responses.
- (d) Brief for lost communications.

b. Change your thinking:

- (1) Avoid thoughts that reinforce a sense of invulnerability, impulsivity, and machismo.
- (2) Avoid absolutes and perfectionism.
- (3) Avoid a "pessimistic explanatory style", which is the tendency for one to attribute the negative events of their lives to an internal cause that is both global and stable (i.e. "I am inadequate at everything and I always will be.").
- (4) Focus on the here and now.
- (5) Recognize the choices you make, and increase your sense of personal control.
- (6) Utilize positive and empowering self-statements.

c. Learn to relax:

- (1) The opposite of stress is relaxation. You cannot be stressed and relaxed at the same time, so learn to relax to combat your stress.
- (2) Utilize deep breathing, in particular diaphragmatic breathing, progressive muscle relaxation, or guided imagery to induce a relaxation response.
- (3) Don't let a busy schedule crowd out the activities that you normally do to relieve stress (i.e. hobbies).

d. Ventilate stress:

- (1) A regular exercise routine of 30 minutes of aerobic activity three to four times a week has been shown to help prevent stress and combat its effects.
- (2) Talk it out to gain support and understanding. Talk to professionals to gain insight about problem-solving methods when support from others doesn't ameliorate the stressor. Resources include:
 - (a) Friends and family members.
 - (b) Flight surgeon and aeromedical physical assistant.
 - (c) Psychiatrist, psychologist, and social worker.
 - (d) Chaplain.
 - (e) ADAPCP (Army Drug and Alcohol Prevention and Treatment Program).

NOTE: Conduct a check on learning and summarize the learning activity.

CHECK ON LEARNING: Conduct a check on learning and summarize the ELO.

H. ENABLING LEARNING OBJECTIVE

ACTION:	Select the factors that will decrease one's vulnerability to combat stress.
CONDITIONS:	Given a list.
STANDARDS:	IAW Flight Stress and FM 22-51.

1. Learning Step / Activity 1. Provide instruction on the factors that will decrease one's vulnerability to combat stress.

Method of Instruction: Conference / Discussion

Instructor to Student Ratio: 1:50

Time of Instruction: 5 mins

Media: Large Group Instruction

a. Combat Stress is a range of signs and symptoms that may be experienced by soldiers in combat. Examples of signs and symptoms, in increasing severity, include:

(1) Hyperalertness

(2) Fear, anxiety

(3) Physical stress complaints

(4) Loss of confidence

(5) Impaired duty performance

(6) Erratic actions, outbursts

(7) Freezing, immobility

(8) Impaired speech or muteness

(9) Impaired vision, touch, or hearing

(10) Weakness and paralysis

(11) Hallucinations, delusions

b. If less severe warning signs respond quickly to helping actions, continue to monitor the soldier until all signs resolve. The soldier will likely not need to be evacuated or relieved of his duties. If warning signs persist and/or worsen, and interfere with the soldier's duty performance, medical treatment facilities can provide brief restorative treatment with a timely return to duty.

c. Factors that may decrease one's vulnerability to combat stress include:

(1) Competence in your work

(2) Confidence in your abilities

(3) High morale, group cohesion, and esprit de corps

(4) Control, or even perceived control

NOTE: Conduct a check on learning and summarize the learning activity.

CHECK ON LEARNING: Conduct a check on learning and summarize the ELO.

I. ENABLING LEARNING OBJECTIVE

ACTION:	Select the definition of fatigue.
CONDITIONS:	Given a list of definitions.
STANDARDS:	IAW FM 3-04.301, and Leader's Guide to Crew Endurance.

1. Learning Step / Activity 1. Provide instruction on the definition of fatigue.

Method of Instruction: Conference / Discussion
Instructor to Student Ratio: 1:50
Time of Instruction: 5 mins
Media: Large Group Instruction

- a. Fatigue is the state of feeling tired, weary, or sleepy that results from periods of anxiety, exposure to harsh environments, or loss of sleep.
- b. Sleep deprivation, disrupted diurnal cycles, and stressful life events all play a role in producing fatigue and impairing performance.

NOTE: Conduct a check on learning and summarize the learning activity.

CHECK ON LEARNING: Conduct a check on learning and summarize the ELO.

J. ENABLING LEARNING OBJECTIVE

ACTION:	Select the three types of fatigue.
CONDITIONS:	Given a list.
STANDARDS:	IAW FM 3-04.301, and Leader's Guide to Crew Endurance.

1. Learning Step / Activity 1. Provide instruction on the three types of fatigue.

Method of Instruction: Conference / Discussion
Instructor to Student Ratio: 1:50
Time of Instruction: 5 mins
Media: Large Group Instruction

- a. Acute.
 - (1) Associated with physical or mental activity between two regular sleep periods
 - (2) Eliminated after a regular sleep period.
- b. Chronic.
 - (1) Results from an inadequate recovery from successive periods of acute fatigue
 - (2) One regular sleep period will not eliminate chronic fatigue; however, several sleep periods and reduced interim activity can help eliminate it.
- c. Motivational exhaustion or "burnout".

(1) Poorly managed stress (i.e., unresolved psychosocial problems, prolonged frustration, excessive worry, loss of control) will lead to exhaustion and burnout.

(2) Without resolution of the stress, restorative measures may only have temporary effects.

(3) Burnout is especially dangerous if unrecognized.

NOTE: Conduct a check on learning and summarize the learning activity.

CHECK ON LEARNING: Conduct a check on learning and summarize the ELO.

K. ENABLING LEARNING OBJECTIVE

ACTION:	Select the signs and symptoms of fatigue.
CONDITIONS:	Given a list.
STANDARDS:	IAW FM 3-04.301 and Leader's Guide to Crew Endurance.

1. Learning Step / Activity 1. Provide instruction on the signs and symptoms of fatigue.

Method of Instruction: Conference / Discussion

Instructor to Student Ratio: 1:50

Time of Instruction: 5 mins

Media: Large Group Instruction

a. Fatigue is the state of feeling tired, weary, or sleepy that results from periods of anxiety, exposure to harsh environments, or loss of sleep.

b. Sleep deprivation, disrupted diurnal cycles, and stressful life events all play a role in producing fatigue and impairing performance.

c. Signs and symptoms of fatigue include:

(1) Attention and concentration are difficult.

(2) Feel or appear dull and sluggish.

(3) General attempt to conserve energy.

(4) Feel or appear careless, uncoordinated, confused, and irritable.

(5) The cognitive deficits are often seen before the physical effects are felt. Therefore, fellow crew members may notice an aviator's decreased attention and concentration abilities before the aviator is aware of it.

NOTE: Conduct a check on learning and summarize the learning activity.

CHECK ON LEARNING: Conduct a check on learning and summarize the ELO.

L. ENABLING LEARNING OBJECTIVE

ACTION:	Select the effects of fatigue on performance.
CONDITIONS:	Given a list.
STANDARDS:	IAW FM 3-04.301, Flight Stress, and Leader's Guide to Crew Endurance.

1. Learning Step / Activity 1. Provide instruction on the effects of fatigue on performance.

Method of Instruction: Conference / Discussion
Instructor to Student Ratio: 1:50
Time of Instruction: 5 mins
Media: Large Group Instruction

a. Reaction times increase, and the quality of motor movements decrease through:

- (1) Errors in timing and accuracy of responses.
- (2) Not as smooth on the controls.
- (3) Slow and irregular motor inputs.

b. Attention is reduced:

(1) A "Lapse" of attention is a transient episode of a complete loss of awareness and failure to respond to external stimuli. This is also referred to as "microsleeps". These usually last from 1 to 10 seconds, and increase in number and duration as sleep deprivation increases.

- (2) Cognitive and Perceptual Tunneling under stress.
- (3) Need enhanced stimuli to maintain attention.
- (4) Overall reduced audio-visual scan.

c. Memory is diminished:

- (1) Inaccurate recall of operational events.
- (2) Ability to learn new information is compromised.

d. Overall poor and careless performance.

e. Greater tolerance for error.

f. Impairments in communication, cooperation, and crew coordination:

- (1) Conversations become more fragmented and repetitive.
- (2) Misinterpretations occur more easily.

(3) Increased potential for error in communicating critical mission, flight, or safety information.

NOTE: Conduct a check on learning and summarize the learning activity.

CHECK ON LEARNING: Conduct a check on learning and summarize the ELO.

M. ENABLING LEARNING OBJECTIVE

ACTION:	Select the characteristics of the body's diurnal rhythms.
CONDITIONS:	Given a list.
STANDARDS:	IAW Leader's Guide to Crew Endurance.

1. Learning Step / Activity 1. Provide instruction on the characteristics of the body's diurnal rhythms.

Method of Instruction: Conference / Discussion
Instructor to Student Ratio: 1:50
Time of Instruction: 5 mins
Media: Large Group Instruction

a. We have an intrinsic biological clock with a cycle of roughly 24-25 hours.

b. The diurnal rhythms control:

(1) Alertness.

(2) Core body temperature.

(3) Heart rate.

(4) Hormonal secretions.

c. Performance varies with these cycles. In the typical circadian cycle, performance peaks between 0800 and 1200 hours, and falls to a minimum circadian trough between 0300 and 0600.

d. While the body clock is inherently capable of monitoring the passage of time, it differs from most clocks in that it is flexible and must be set, or synchronized, before it can accurately predict the timing of events. External synchronizers, or Zeitgeber (German for "time givers") are:

(1) Sunrise or sunset.

(2) Ambient temperature.

(3) Social cues and meals.

NOTE: Conduct a check on learning and summarize the learning activity.

CHECK ON LEARNING: Conduct a check on learning and summarize the ELO.

N. ENABLING LEARNING OBJECTIVE

ACTION:	Select the definition of circadian desynchronization.
CONDITIONS:	Given a list.
STANDARDS:	IAW Leader's Guide to Crew Endurance.

1. Learning Step / Activity 1. Provide instruction on the definition of circadian desynchronization.

Method of Instruction: Conference / Discussion
Instructor to Student Ratio: 1:50
Time of Instruction: 5 mins
Media: Large Group Instruction

a. Circadian Desynchronization, or "jet lag", is due to rapid travel from one time zone to another, which causes the body to resynchronize its diurnal rhythms to the local geophysical and social cues. Until intrinsic rhythms are reset, sleep disorders and fatigue will prevail.

(1) Eastward travel shortens the day.

(2) Westward travel lengthens the day.

(3) Resynchronization occurs much more rapidly when traveling west.

b. Shift work can have effects similar to crossing time zones due to the changes in light exposure and activity times.

NOTE: Conduct a check on learning and summarize the learning activity.

CHECK ON LEARNING: Conduct a check on learning and summarize the ELO.

O. ENABLING LEARNING OBJECTIVE

ACTION:	Select the characteristics of the sleep cycle.
CONDITIONS:	Given a list.
STANDARDS:	IAW Leader's Guide to Crew Endurance.

1. Learning Step / Activity 1. Provide instruction on the characteristics of the sleep cycle.

Method of Instruction: Conference / Discussion
Instructor to Student Ratio: 1:30
Time of Instruction: 5 mins
Media: Large Group Instruction

- a. Sleep is not simply being unconscious. It is a life-essential, active, recuperative process.
- b. The sleeping brain cycles through rapid eye movement (REM) and Non-REM sleep stages. It takes about 90 minutes to cycle once through all these stages of sleep, and the brain normally cycles through this 5 to 6 times a night. As a result, the average person sleeps 7 to 9 hours per night.
- c. The duration and quality of sleep are dependent upon body temperature. People sleep longer and report a better night's sleep when they retire near the temperature trough.
- d. It is the timing of sleep, not necessarily the amount of sleep that is most significant.
- e. Sleep efficiency deteriorates with age. Older individuals spend less time in deep Non-REM sleep, and nighttime awakenings are more common.

NOTE: Conduct a check on learning and summarize the learning activity.

CHECK ON LEARNING: Conduct a check on learning and summarize the ELO.

P. ENABLING LEARNING OBJECTIVE

ACTION:	Identify the factors that determine the sleep required by the average aircrew member.
CONDITIONS:	Given a list.
STANDARDS:	IAW Leader's Guide to Crew Endurance.

1. Learning Step / Activity 1. Provide instruction on the factors that determine the sleep required by the average aircrew member.

Method of Instruction: Conference / Discussion
 Instructor to Student Ratio: 1:50
 Time of Instruction: 5 mins
 Media: Large Group Instruction

- a. Individuals cannot accurately determine their own impairment from sleep loss.
- b. Sleep can be reduced 1 to 2 hours without performance decrement over an extended period, although the individual must return to a normal sleep length once the period ends.
- c. Five hours a night is the absolute minimum for CONOPS (i.e. 14 days).
- d. Some individuals may tolerate as little as 4 hours per night for short periods (up to a week), but there is no easy way to determine who will function best with the least sleep.
- e. Sleep restriction decisions and crew endurance planning should consider:
 - (1) The complexity of the job.

(2) The potential for loss from errors.

(3) Individual tolerance to sleep loss.

NOTE: Conduct a check on learning and summarize the learning activity.

CHECK ON LEARNING: Conduct a check on learning and summarize the ELO.

Q. ENABLING LEARNING OBJECTIVE

ACTION:	Select strategies for preventing fatigue.
CONDITIONS:	Given a list.
STANDARDS:	IAW FM 3-04.301, Fundamentals of Aerospace Medicine, and Leader's Guide to Crew Endurance.

1. Learning Step / Activity 1. Provide instruction on the strategies for preventing fatigue.

Method of Instruction: Conference / Discussion

Instructor to Student Ratio: 1:50

Time of Instruction: 5 mins

Media: Large Group Instruction

a. Schedule appropriate sleep periods.

b. Prevent and/or control circadian desynchronization by maintaining a consistent sleep schedule. If circadian desynchronization is unavoidable (shift work or time zone change), then implement countermeasures to ensure adequate sleep quality such as:

(1) Minimizing daylight exposure during sleep periods.

(2) Controlling the sleep environment (dark, cool, noise).

(3) Utilize napping.

c. Build endurance through physical conditioning and good stress management skills.

d. Practice good nutrition habits.

e. Practice good "Sleep Hygiene":

(1) Use bed for sleep and sex only.

(2) Establish a bedtime routine.

(3) Avoid looking at clocks. Instead, set backup alarms.

f. Napping:

(1) When sleep is not available, or shortened by operational constraints, naps are a viable alternative.

(2) Naps as short as 10-minutes are restorative.

(3) Longer naps (greater than 45-minutes to 1 hour) may result in a period of sluggishness called "Sleep Inertia", which can last for 5- to 20- minutes after awakening.

(4) Best to nap during circadian troughs (0300 to 0600, and about 1300 to 1500).

NOTE: Conduct a check on learning and summarize the learning activity.

CHECK ON LEARNING: Conduct a check on learning and summarize the ELO.

R. ENABLING LEARNING OBJECTIVE

ACTION:	Select the appropriate treatments for sleep deprivation and fatigue.
CONDITIONS:	Given a list.
STANDARDS:	IAW FM 3-04.301 and Leader's Guide to Crew Endurance.

1. Learning Step / Activity 1. Provide instruction on the appropriate treatments for sleep deprivation and fatigue.

Method of Instruction: Conference / Discussion

Instructor to Student Ratio: 1:50

Time of Instruction: 5 mins

Media: Large Group Instruction

- a. Get adequate rest and natural sleep (not drug-induced). Alcohol is the most common sleep aid in the United States, but it suppresses REM sleep and will leave you feeling unrefreshed upon awakening.
- b. Control the sleep environment.
- c. Rotate duties to avoid boredom.
- d. Avoid complex tasks that require intense mental activity.
- e. Limit work periods and delegate responsibility. If possible, suspend activity during periods when fatigue is higher and efficiency is lower.
- f. Remove yourself from flying duties when fatigue affects the safety of flight.
- g. Use brief periods of exercise to increase your level of alertness.
- h. Practice good nutrition habits by limiting caffeine and eating in moderation.

NOTE: Conduct a check on learning and summarize the learning activity.

CHECK ON LEARNING: Conduct a check on learning and summarize the ELO.

SECTION IV. SUMMARY

Method of Instruction: <u>Conference / Discussion</u>
Instructor to Student Ratio is: <u>1:50</u>
Time of Instruction: <u>5 mins</u>
Media: <u>Large Group Instruction</u>

Check on Learning

QUESTION: What is Hans Selye's definition of stress?

ANSWER: The nonspecific response of the body to any demand placed upon it.

QUESTION: Provide two cognitive signs and symptoms of stress.

ANSWER: Worry, or decreased memory, attention, judgment, or psychomotor coordination.

QUESTION: Provide two actions to prevent suicide in a coworker who has hinted out it to you.

ANSWER: Talk supportively, be direct and ask, and escort to medical personnel or command.

QUESTION: What are the four classes of stressors?

ANSWER: Environmental, psychosocial, cognitive, and alcohol.

QUESTION: What are the factors that influence the impact of stress on performance?

ANSWER: Required mental skills, stress characteristics of the situation, biological make-up, psychological make-up.

QUESTION: What is the name for a decrease in one's visual field due to stress?

ANSWER: Perceptual tunneling

QUESTION: What is the most effective stress coping mechanism?

ANSWER: Avoiding stress.

QUESTION: Name two factors that decrease one's vulnerability to combat stress.

ANSWER: Competence, confidence, group cohesion, and control

QUESTION: Define fatigue.

ANSWER: The state of feeling tired, weary, or sleepy that results from periods of anxiety, exposure to harsh environments, or loss of sleep.

QUESTION: What are the three types of fatigue?

ANSWER: Acute, Chronic, Motivational Exhaustion/Burnout.

QUESTION: Name two signs and symptoms of fatigue.

ANSWER: Decreased attention, sluggishness, attempts to conserve energy, and carelessness.

QUESTION: Name two effects of fatigue on performance.

ANSWER: Increased reaction time and tolerance for error, decreased attention, memory, and communication abilities.

QUESTION: Based on your circadian rhythms, at what time are you likely to be at peak performance?

ANSWER: 0800 to 1200

QUESTION: Which direction of travel results in more rapid resynchronization?

ANSWER: West

QUESTION: The average human needs how many hours of sleep to cycle through the 5 to 6 stages of REM sleep?

ANSWER: Seven to Nine hours.

QUESTION: Can one accurately determine his own impairment from sleep loss?

ANSWER: No

QUESTION: Name three ways to control the sleep environment.

ANSWER: Keep environment dark, cool, and free of excessive noise.

QUESTION: Why should you not use alcohol as a sleep aid or to treat sleep deprivation and fatigue?

ANSWER: It suppresses REM sleep.

**Review /
Summarize
Lesson**

A. Review all topics covered.

B. Closing Statement.

1. Solicit student questions and explanations.
 2. Questions and answers.
 3. Correct student misunderstandings.
-

SECTION V. STUDENT EVALUATION

Testing Requirements

NOTE: Describe how the student must demonstrate accomplishment of the TLO.
Refer student to the Student Evaluation Plan.

Feedback Requirements

NOTE: Feedback is essential to effective learning. Schedule and provide feedback on the evaluation and any information to help answer students' questions about the test. Provide remedial training as needed.

Appendix A - Viewgraph Masters (N/A)

Appendix B - Test(s) and Test Solution(s) (N/A)

Appendix C - Practical Exercises and Solutions (N/A)

Appendix D - Student Handouts (N/A)